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FACULTY OF EGINEERING

Digital Image Processing
LECTURE-04

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OUTLINE

- Applications of image processing
- What's an image?
- Fundamental steps in image processing
- MCQ
- References

Applications of image processing:

• Interest in digital image processing methods stems from 2 principal application areas:

(1) improvement of pictorial information for human interpretation, and

(2) processing of scene data for autonomous machine perception.

• In the second application area, interest focuses on procedures for extracting from an image information in a form suitable for computer processing.

• Examples include automatic character recognition, industrial machine vision for product assembly and inspection, military recognizance, automatic processing of fingerprints etc.

What's an image?

• An image refers to a 2D light intensity function f(x,y), where (x,y) denote spatial coordinates and the value of f at any point (x,y) is proportional to the brightness or gray levels of the image at that point.

• A digital image is an image f(x,y) that has been discretized both in spatial coordinates and brightness.

• The elements of such a digital array are called image elements or pixels.

A simple image model:

• To be suitable for computer processing, an image f(x,y) must be digitalized both spatially and in amplitude.

• Digitization of the spatial coordinates (x,y) is called image sampling.

• Amplitude digitization is called gray-level quantization.

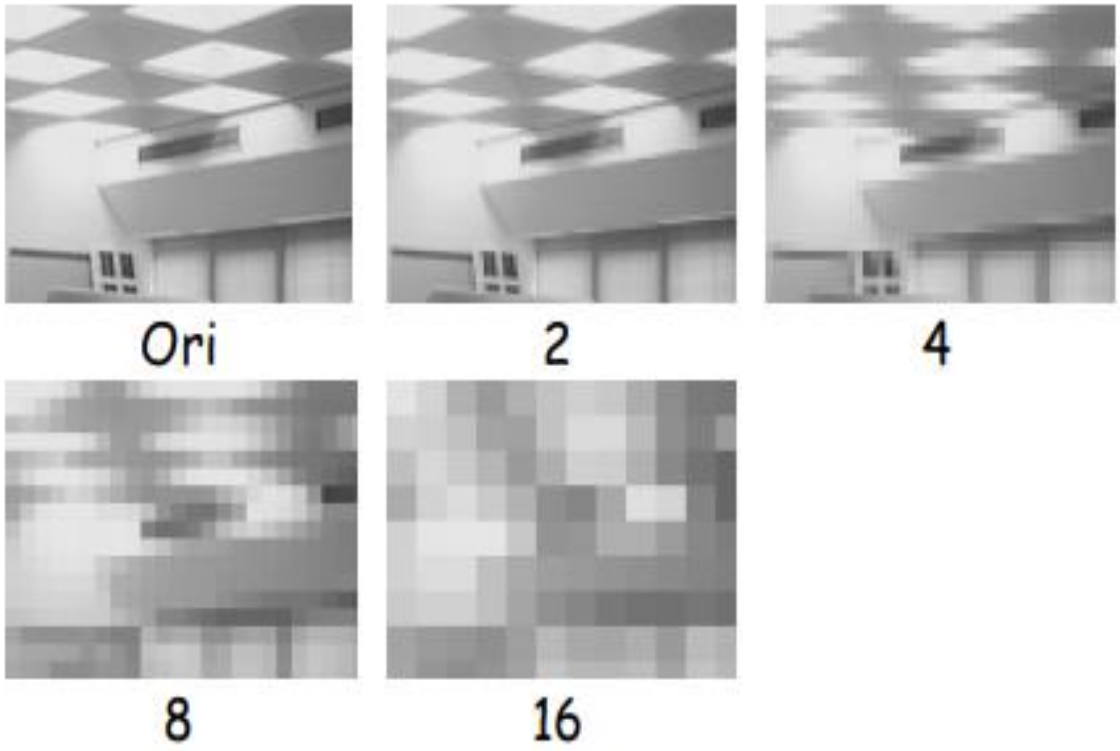
•The storage and processing requirements increase rapidly with the spatial resolution and the number of gray levels.

• **Example:** A 256 gray-level image of size 256x256 occupies 64K bytes of memory.

• Images of very low spatial resolution produce a checkerboard effect.

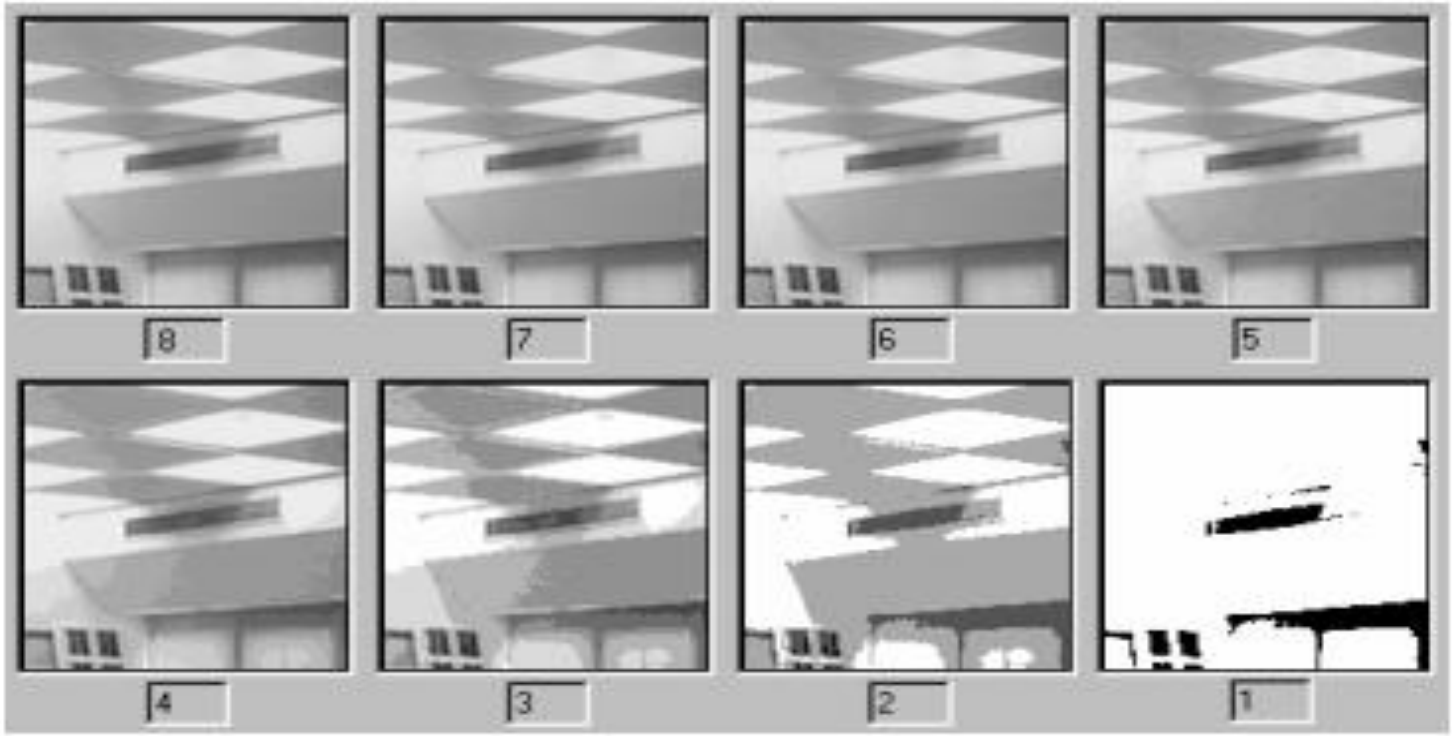
What's an image?

- The use of insufficient number of gray levels in smooth areas of a digital image results in false contouring.



Images of different spatial resolution

What's an image?



Images of different amplitude resolution

Fundamental steps in image processing

1. **Image acquisition:** to acquire a digital image

2. **Image preprocessing:** to improve the image in ways that increase the chances for success of the other processes.

3. **Image segmentation:** to partitions an input image into its constituent parts or objects.

4. **Image representation:** to convert the input data to a form suitable for computer processing.

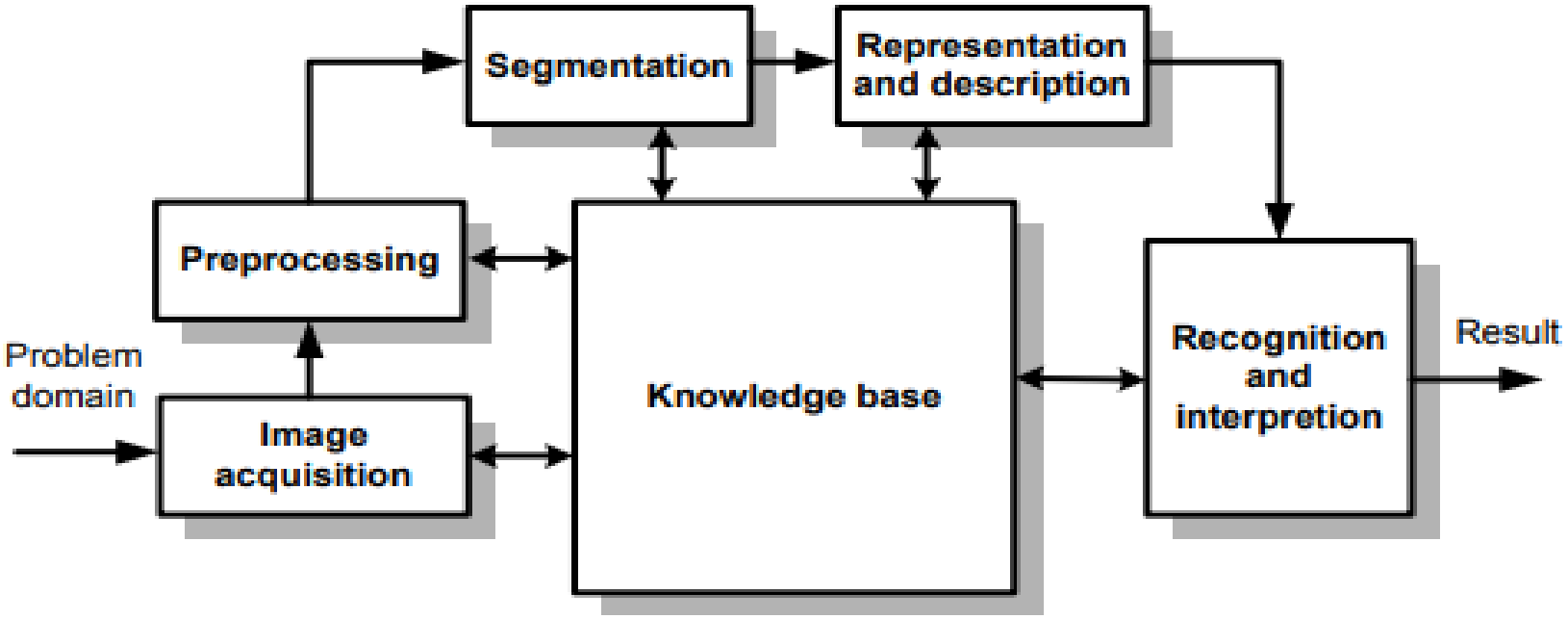
5. **Image description:** to extract features that result in some quantitative information of interest or features that are basic for differentiating one class of objects from another.

6. **Image recognition:** to assign a label to an object based on the information provided by its descriptors.

7. **Image interpretation:** to assign meaning to an ensemble of recognized objects.

• Knowledge about a problem domain is coded into an image processing system in the form of a knowledge database.

Fundamental steps in image processing



Fundamental steps in image processing

MCQ

The most familiar single sensor used for Image Acquisition is

a) Microdensitometer

b) Photodiode

c) CMOS

d) None of the Mentioned

2. A geometry consisting of in-line arrangement of sensors for image acquisition

a) A photodiode

b) Sensor strips

c) Sensor arrays

d) CMOS

3. CAT in imaging stands for

a) Computer Aided Telegraphy

b) Computer Aided Tomography

c) Computerised Axial Telegraphy

d) Computerised Axial Tomography

MCQ

4. The section of the real plane spanned by the coordinates of an image is called the _____

a) Special Domain

b) Coordinate Axes

c) Plane of Symmetry

d) None of the Mentioned

5. The difference is intensity between the highest and the lowest intensity levels in an image is _____

a) Noise

b) Saturation

c) Contrast

d) Brightness

References

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